IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Attorney Docket: S1011/20128

In the matter of the Patent Application of
CLARKE and HAMMOND

Serial No.10/043,831 — Group Art Unit: 3635

Filed: 11 January 2002 — Examiner: R. Canfield

Title: **Doors** — Date: 06 September 2004

DECLARATION

Mr. Ernest Kenneth Hammond declares as follows:

1. I am one of the inventors of the above-identified patent application.

2. I have read the Office Actions mailed 09 March 2004 and 02 July 2003.

3. I have read the prior art cited by the examiner in the above-identified Office Actions.

4. By way of background, I have worked in the field of polymers for 34 years.

   I currently work for Polymer Engineering Limited (the assignee of the above-identified application) as the sales director, a position I have held for 4 years. My tasks within Polymer Engineering Limited are, *inter alia*, to devise new products and to oversee the development of our product range. I am responsible for overseeing the company's intellectual property portfolio. I am named as an inventor on each of Polymer Engineering's portfolio of granted and pending patents, all of which relate to the field of doors fabricated from plastics materials.

   Prior to joining Polymer Engineering Limited I was employed by Minster Composites Limited as Director – General Manager for 5 years. My tasks included development and introduction of composite products for the building and construction market.

   Accordingly, I have significant experience in polymer manufacturing industries and specifically in the manufacture and design of doors made from thermoplastic materials and thermosetting resins.

5. One of the important inventive features embodied in the above-identified patent application is that by fabricating a door **entirely** from thermosetting resins a number of advantages are derived, as follows:

   - Thermosetting resins have a lower coefficient of thermal expansion than thermoplastics materials and so the door (in particular the skin) will not warp when exposed to sunlight and/ or cold weather;

- Because all the materials of construction have similar coefficients of thermal expansion there is a reduced risk of delamination or distortion compared to doors, which are fabricated from components made from thermoplastics materials **and** thermosetting resins.

6. Certain particular features of the invention also afford the door of the invention with further advantages, as follows:

    - The use of structural density foam (*i.e.* a foam with a density in excess of 200 kg m^{-3}) provides the door with structural integrity and makes the door resistant to bludgeoning and piercing blows;

    - The use of structural density foams ensures that screws can be retained by and within the foam without the need for further reinforcement, for example to hang the door from hinges. By way of example, the force required to pull a screw from a foam with a density of 300 kg m^{-3} (*i.e.* a structural density foam) is in excess of 2 kN, as measured by British Standard BS 6948 [ASTM equivalent unknown];

    - The use of thin-walled pultrusion to form frame members for use in the door ensures that the frame members are both strong and not too heavy. It also allows for complex shapes to be formed. For example to provide a recess in which a weather seal is receivable;

    - The frame members are provided with wall members, which embrace the edge of the foam core, ensuring that the edge of the door is provided with extra strength.

    - The wall members of the frame are provided with rebated portions to receive adhesive. The provision of rebates along the length of each side-wall of a frame member ensures that the bond between door skin and frame is particularly strong and ensures that moisture cannot permeate the internal structure of the door.

7. To the best of my belief and knowledge there was no disclosure of a door having all of the features of the door, frame member and method described and claimed in our above-identified patent application prior to our invention thereof.

8. Previously, most manufacturers had concentrated their efforts on using thermoplastics materials because of their relative cheapness and their ease of handling and manufacture. Thermoplastics materials were considered to be able to withstand the conditions to which they were to be exposed for at least as long as a conventional wooden door (which will require intermittent repainting and eventual replacement).

9. The use of foam materials in plastics doors has been known for some time. To the best of my knowledge and belief there is no universally accepted standard for describing the density of the foam used. Thus, a manufacturer is ostensibly free to call their foam whatsoever they want. For example, I attach

a brochure of Acell Doors Limited, which, I believe, is from 1999 and which shows that their "high density" foam has a density of from 100 to 130 kg m^{-3}. I also attach a copy of a brochure for Pipers Composite Doors, which states that their 'high-density' foam has a density of 4370kg/-M50, or 87.5 kgm^{-3}. These 'high density' foams are not structural density foams of the type employed in the present invention, as described and claimed.

10. I note that GB 2315292 (**'292** - cited in the current proceedings) discloses a foam, which is said to be 'structural' foam. I note that there is no disclosure of the density of the foam used. It is my understanding that Caradon Everest have never made a door according to the teachings of **'292**. It is also my understanding, through conversations with representatives of Caradon Everest that the foam, which they intended to use, was to have a density of 50-100 Kg m^{-3}, *i.e.* **not** a structural density foam as required in our above-identified patent application. The fact that **'292** discloses that reinforcement around the hinge fittings is desired (see line 3 to 7 of page 6) provides further indication to me that the foam is not 'structural density', as is required by our above-identified patent application. I further note that polyurethane (the foam material disclosed in **'292**) may be either a thermoplastic material or a thermosetting resin. There is no positive direction in **'292** as to which is to be used.

11. I also note that **'292** discloses the use of 'PVC or glass reinforced plastics' as the preferable materials from which the frame members are fabricated. Because PVC and glass reinforced plastics are dealt with as equivalent materials I interpret the reference to glass-reinforced plastics as meaning an extruded thermoplastic material carrying glass rovings and **not** a thermosetting resin in which elongate tows of fibres are present (as is the case with the pultruded frame members of our above-identified patent application).

12. GB 2334991 (**'991** – cited in the current proceedings) discloses a door comprising a frame, which may be fabricated by either extruding thermoplastics materials or by pultruding glass reinforced polyester. It is my interpretation that the frame shown in Figure 6 (*i.e.* having the integral gasket holder) would have been fabricated by extruding PVC, in accordance with the teaching of GB 2183706, to which **'991** refers and that the frame members of Figures 4 and 5 were formed by pultruding polyester. Further evidence in support of this interpretation is to be found at line 33 of page 4 wherein it states that a substantially rectangular form makes for "...easy pultrusion."

13. **'991** discloses that the cavity defined by the frame may be filed with insulating material. There is no disclosure of the density of the 'insulating material'. However, because **'991** discloses that steel reinforcement members are required to increase the screw pull out strength of a screw (line 32 to 33 of page 7), I would interpret the density of the 'insulating material' to be certainly lower than the structural density foams disclosed in our above-identified patent application.

14. US 3546841 (**'841** – cited in the current proceedings) discloses a door, which has metal or extruded plastics frame members (line 36 to 38 of column 3), not pultruded frame members. The skins are formed from thermoplastics materials (line 10 to 12 of column 3), not thermoset materials and the foam filler may be formed from open or closed cell polyurethane which is said to be "...rather light in weight", not structural density foam of the type employed in this invention. Therefore, I do not consider that the **'841** patent teaches a door according to our above-identified patent application.

15. US 6138435 (**'435** – cited in the current proceedings) discloses a sheet-like composite element. There is no mention of using or forming the composite elements as doors. I note that the border elements may be fabricated from metal or plastics, and that the plastics are to be compression moulded or extruded. I note that the preferred material is aluminium. I also note that the core material can be a polyurethane foam. However, there is no mention of the desired density of the foam. There is also no mention of fabricating a sheet-like composite element entirely from one form of material (*e.g.* thermosetting resins) to ensure that all of the components have similar coefficients of thermal expansion. Therefore, I do not consider the **'435** patent as teaching the features of our above-identified patent application.

16. Accordingly, I do not see anything from the cited prior art which would have encouraged me to provide a method of forming a door, a door *per se*, or a pultruded length for a framework for a door, having the following combination of features:

> *A method of forming a door wholly composed of thermoset plastics, the method comprising the steps of: forming a body of synthetic, structural-density, thermoset foam material having a density in excess of 200 kg/m^3 and connecting a length of pultruded, synthetic, thermoset material to one edge of the body, the length comprising two side walls having sections extending in opposed directions from a base, an outer face of each side wall located on each side of the base having spaced apart projections providing recesses for receiving adhesive therein, said base overlying said one edge of the body with sections of the two side walls extending in one direction from said base overlying side walls of said body, attaching lengths of pultruded, synthetic, thermoset material to the other edges of the body to provide a peripheral framework, applying an adhesive within the recesses provided between the spaced apart projections in the sections of the side walls located on each side of the base and then applying a skin of thermoset material overlying said adhesive to cover outer faces of said side wall including said adhesive on both sides of the base and curing the adhesive to unite the skin to the framework and cover said body.*
>
> *A door comprising a thermoset framework formed from lengths of pultruded, synthetic, thermoset material, said framework defining a space at least partially occupied by a core comprising a body of synthetic, structural-density, thermoset foam material having a density in excess of 200 kg/m^3, wherein the framework is rectangular, said door including thermoset plastic skins extending across opposed faces of said body of synthetic, structural-density, thermoset foam material*

and said framework, said framework having top and bottom lengths and opposed side lengths, at least one of said side lengths comprising a base contacting an edge of said foam material and two side arms extending in opposed directions from said base, portions of said side arms extending in one direction from said base being disposed between said body of synthetic, structural-density, thermoset foam material and said skins, said skins extending in overlying relationship with portions of said side arms extending in said other of said directions from said base and wherein an outer face of said side arms extending in both directions from said base including recesses for receiving and retaining set adhesive by which said skins, body of thermoset foam material and said side lengths are held together.

A pultruded length for a framework for a door wherein said length comprises:

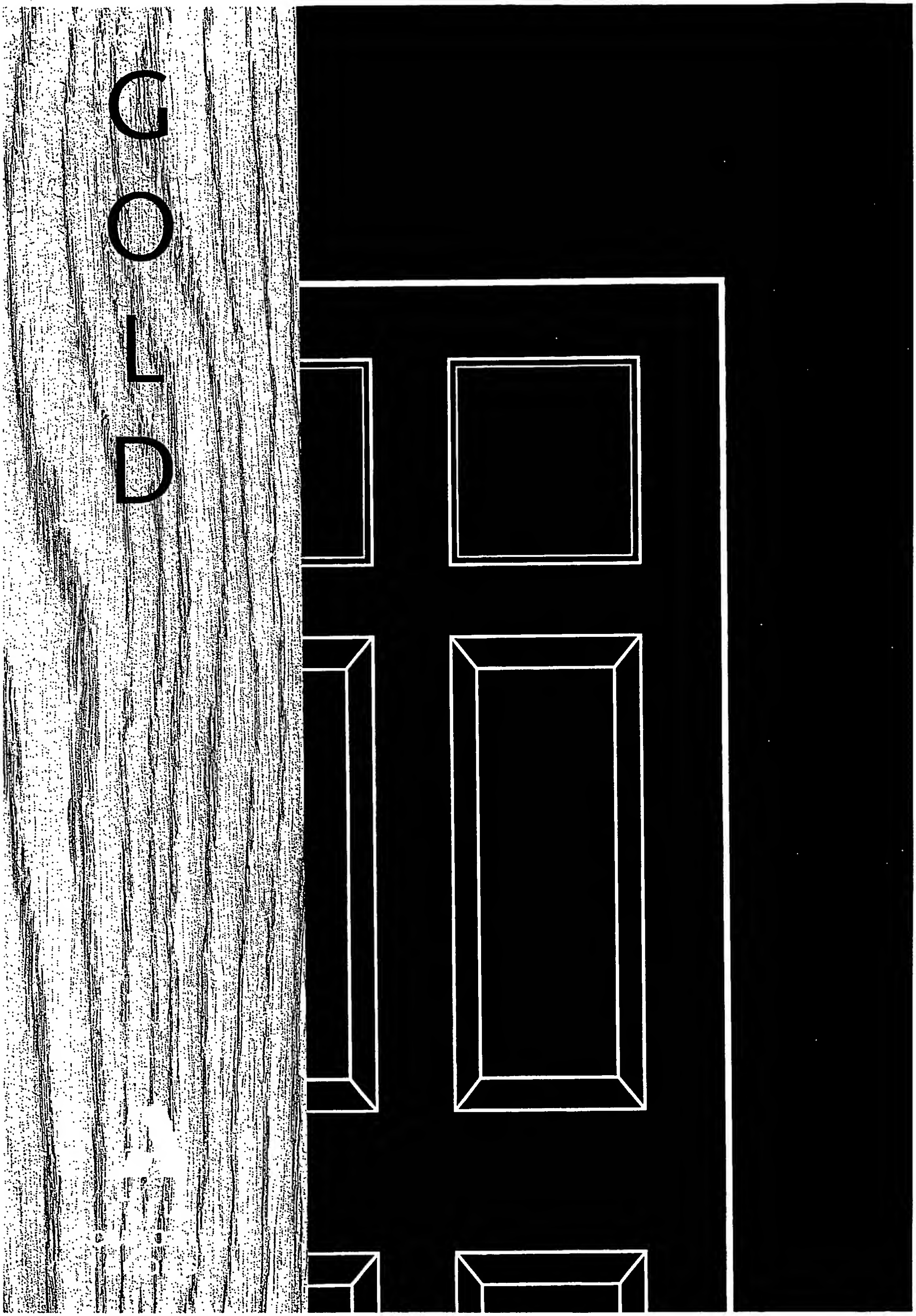
a hollow body having a base portion to contact an edge of a foam body; two side arms which extend from said base portion on opposed sides thereof, said two side arms extending on one side of said base portion being located between said foam body and facing door skins when said length forms part of a door and said two side arms extending on said opposed side of said base portion being located adjacent and facing said door skins in regions of said door skins extending beyond said foam body when said length is employed as part of a door; and wherein each of said side arms has an outer face having spaced apart recesses on both sides of said base portion for receiving and retaining adhesive by which a door skin and said length are held together.

17. In other words, no matter how one interprets the citations there is no explicit teaching or foreshadowing of the combination of features of the current invention. The prior art does not direct, recommend or suggest that features from individual citations be combined to meet or render obvious the invention specified in this application, as set forth in paragraph 16 above.

18. I declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true and further that these statements were made with the knowledge that wilful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of title 18 of the United States Code and that such wilful false statements may jeopardize the validity of the present application or any patent issuing thereon.

Signed: _____
Ernest Kenneth Hammond

Date: 6. Sept 2004


GOLD

ACELL GOLD RANGE

Incorporating the Acell Technology, and a match for any composite door, comes our 'Gold' range. Using timber, insulation and high-impact thermoplastic facings, Acell are able to offer a high-performance external door, suitable for all types of housing. Low maintenance, high security, high insulation values and durability mean that the Gold range can meet the desired high standards and still be cost effective.

GOLD PRODUCT INFORMATION

DESCRIPTION

The Acell Gold door leaf has a patented Acell Foam core, surrounded by a laminated timber veneer substrate. The surface of the door is made from a vacuum formed thermoplastic PVCu skin which is bonded to the Acell® foam core in a unique one step pressing operation. The door is finished prior to despatch with a coating of special stain, which accentuates the realistic woodgrain appearance. Doors can be supplied as complete sets ready to install or as door leafs ready prepared to take mortice, or multi point locking systems via the Acell Fast Fit™ system.

TIMBER SUBFRAME

The door sub-frames are constructed using 75mm wide by 41mm thick laminated timber for the side rails and 115mm by 41mm for the head and stile. The timber is Kerto®-LVL, a laminated Finish spruce which does not warp or twist and is highly fire resistant. Manufactured under ISO 9001 quality system it also carries BBA certification.

ACELL FOAM CORE

A patented frangible foam with a density of 100-130kg/m³. Acell foam provides excellent sound and thermal insulation properties as well as being fire resistant.

SURFACE SKIN/BONDING

The surface of each Acell Gold door comprises of a 1.5mm coloured acrylic capped thermoplastic sheet, which is vacuum formed to provide traditional looking raised and fielded panels. Acell Gold doors have an authentic woodgrain finish due to the unique pressing process and the chemical bond prevents delamination and increases skin toughness. A final application of special Acell stain prior to despatch, further protects the door.

GLAZING

Acell door leafs containing glazeable panels are supplied unglazed with a single slimline glazing bead for each opening. The sealed units fitted, should be 20mm overall thickness and are installed using silicone and/or double sided tape. Glazing rebate depth is 28mm. This glazing system allows for easy glass replacement without damaging or replacing the door.

COLOURS/FINISHES

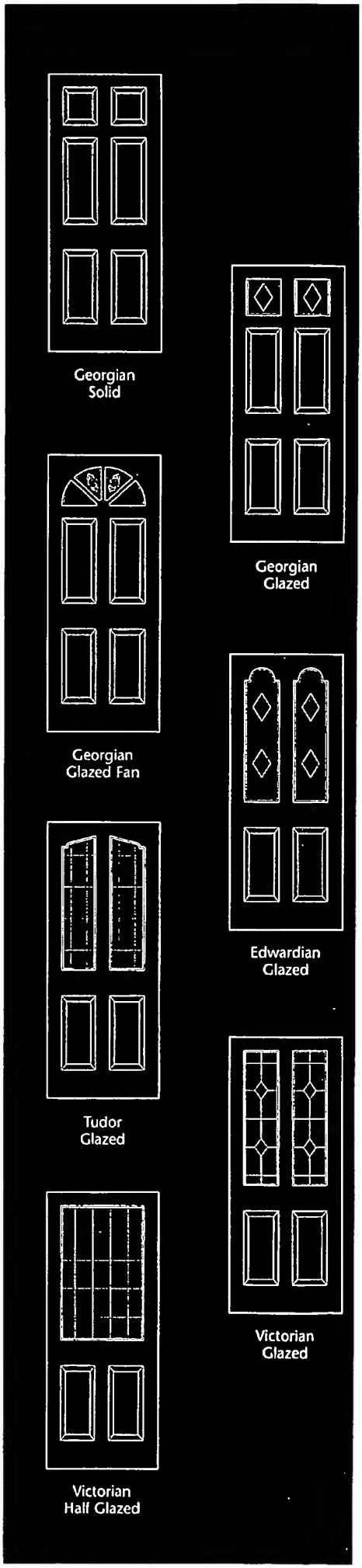
The Acell Gold door leaf is supplied finished in Oak and Mahogany woodgrain finish.

GOLD DOOR SIZES (mm)

DOORS

7 Series	765x2000x44
8 Series	840x2000x44 840x2045x44
9 Series	900x2000x44 900x2045x44

Doors are supplied cut to size from the above range of standard sizes, which ensures minimal post finishing of plaster and brickwork after installation, and a door which is in proportion irrespective of the size of the opening.



ANCILLIARY COMPONENTS

LOCKING SYSTEMS

Acell Door sets can be supplied pre-fitted with a choice of three high security multi-point locking systems, Surelock, Lockmaster, Fullex and Winkhaus. These lock manufacturers meet the recommendations of the Association of British Insurers for minimum security.

If required however, the flexibility of the Acell Fast Fit™ eurogroove system also allows most other multi-point locking systems to be fitted, and in addition five lever mortice locks to BS 3621: 1980 and night latches can be used for a more traditional locking method.

FRAMES

Acell door sets can be supplied with either PVCu, hardwood timber, softwood timber or aluminium frames.

PVCu – frames are available in a range of major profiles designed to accommodate a 44 mm door slab in white or brown, unplasticised polyvinyl chloride material, which is reinforced with galvanised steel.

Hardwood – are supplied from sustainable sources and are coated with Sadolin sealant or similar.

Softwood – are supplied with Vac-Vac preservative treatment and hardwood cills only.

HINGES

Acell door sets are supplied with standard 'Era' lift-off hinges or 'Era' security hinges which are available in either white, brown, or zinc and yellow passivated finishes. The lift-off hinges are adjustable in three directions, have nylon bushes, security non return pins, and provide holes for four stainless steel screws. Acell recommend fitting three hinges to the doors.

THRESHOLDS

Exitex low profile weatherbars, tested to BS 6375 are available in either white, satin anodised or gold finishes. Mitred corners, EPDM seals, an internal thermal barrier, together with matching rain deflector are all standard.

LETTERPLATES

Paddock Hardware sleeved letterplates complying to BS 2911: 1980 are fitted as standard in white, or gold.

VIEWERS/KNOCKERS

Paddock Hardware 180 viewer and knockers can be fitted in brass, silver or black.

WEATHER SEALING

The weather sealing around all Acell doors consists of an optional double sealed system using EPDM/TPE flipper gasket and wool pile weather strip. The sealants comply to BS 4255 Part 1 and BS 7412: 1991, and the weather performance meets BS 6375 Part 1.

GLAZING TAPE

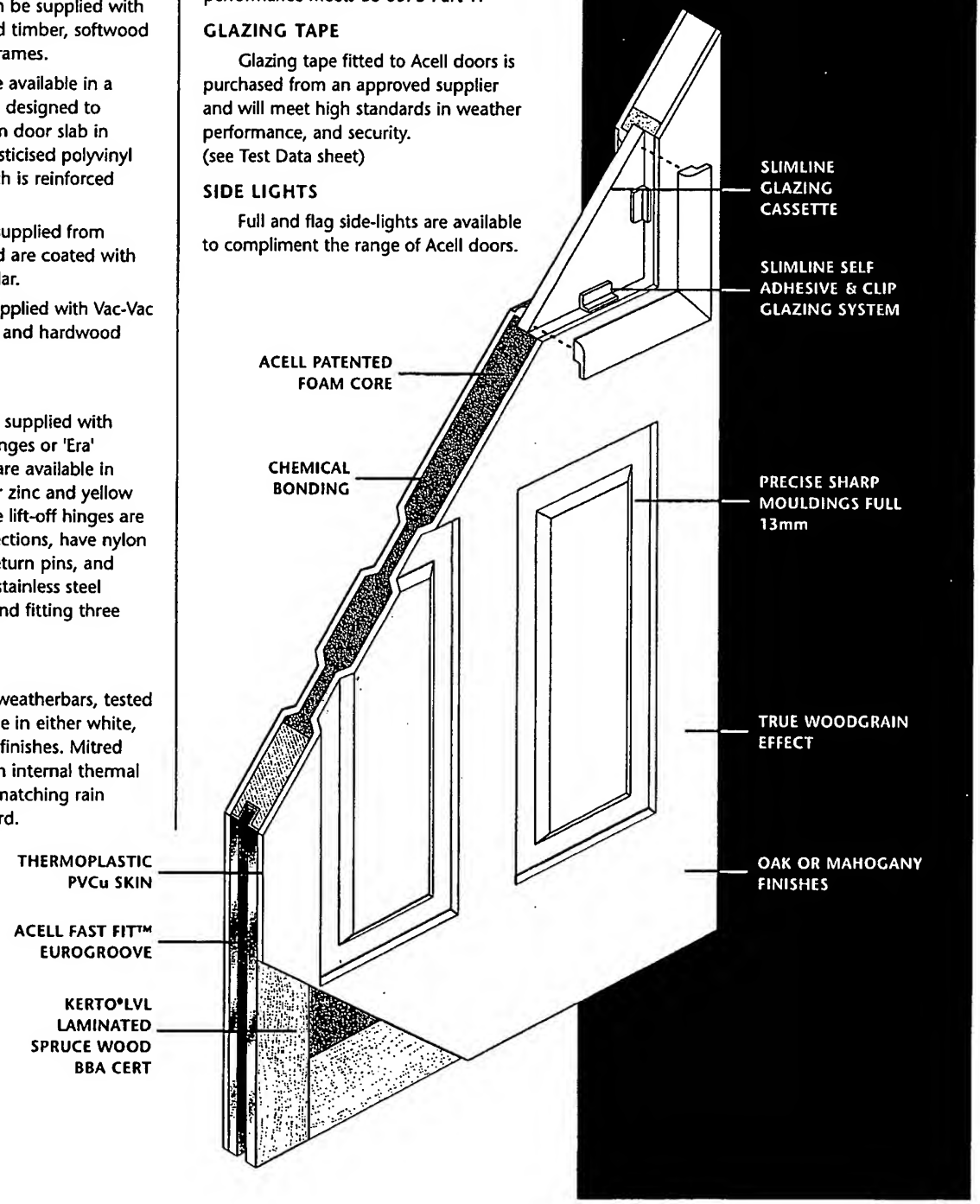
Glazing tape fitted to Acell doors is purchased from an approved supplier and will meet high standards in weather performance, and security.
(see Test Data sheet)

SIDE LIGHTS

Full and flag side-lights are available to compliment the range of Acell doors.

GOLD RANGE

Maintenance free
Highly superior durability
Maximum security
Excellent thermal performance
True woodgrain
Environmentally friendly
Fast fabrication
Traditional styles
Full recess mouldings
10 year guarantee
Last and lasts



SPECIFICATION

Facings = Thermoplastic PVCu

Thickness = 1.5mm

Meets PAS 023 fit for use and PAS 024 Security Standards

Scratch Resistance = High scratch resistance/low maintenance

Insulation = Acell® Foam

Density = 100-130 Kg/m³

'K' Value = 0.045 W/m°c

Acell® core = Class 'O' surface spread of flame

SUB-FRAME

The Acell timber sub-frame is a special laminated Kerto spruce, Kerto®-LVL, which does not warp or twist and is highly fire resistant. It is manufactured under ISO 9001 and carries a BBA certificate number 90/2419.

GLAZING

Acell's Gold door has a clip and self adhesive glazing system to compliment its aesthetic appeal (no visible screw fixings). For security, secret fixings are located through an integrated aluminium steel re-inforcing bar. The Acell glazing system means that glass can be easily replaced without damaging the door.

WEATHER SEALS

All Acell doors have a double sealed system using EPDM/TPE flipper gasket and an optional wool pile weather strip. These sealants comply with BS 4255 Part 1 and BS 7412: 1991. The weather performance achieved meets BS 6375 Part 1.

TEST DATA

WEATHER RESISTANCE

Gold door leafs with a PVCu frame, 1½ pairs of hinges, five lever mortice lock and night latch achieved a 'Severe Weather Rating' Class 'C', obtaining pass levels of 600 Pa for Air Permeability, and 300 Pa for Water Penetration. The Acell Door meets PAS 023 weatherability ratings.

HYGROTHERMAL AND THERMAL DISTORTION

Acells Gold doors were successfully tested to procedures set out in Test 10/11 of the BS DD171: 1987. Additionally these test procedures were conducted to the new European Standard (pr EN 1121). The highest classification was achieved 'Class 3' (less than 2mm bow), at a temperature of 80°c. DD171 tests at 40°c. Tested at BRE.

THERMAL INSULATION

Acell® Foam achieves a 'K' Value of 0.045 W/m°c.

COLOUR

The Acell Gold door leaf is colour stable against UV light.

SECURITY

Acell Reinforced Gold door range meets with PAS 024-1: 1999 for enhanced security and impact tests. Acell Doors also meet the recognised 'Secured by Design' police initiative for security.

FIT FOR USE

Acell Doors meets with PAS 023 fit for use and weatherability standards.

SPECIFICATION CLAUSE

External domestic doors to be of Gold composite type manufactured by 'Acell Doors'. The inner core to comprise of 3mm laminated veneer timber sub-frame, and phenolic foam providing a minimum 'K' Value of 0.045 W/m°c.

Outer skin/surface to be high impact thermoplastic, bonded to the door core. Skin surfaces to have a woodgrain finish, be of *(insert choice)* colour, and UV stable.

The Gold external door is to meet with a Class 'C' Severe weather rating for weather resistance and BS DD171 prEN 1121 for hygrothermal/thermal distortion.

The Gold external composite door should also meet PAS 024-1: 1999 for enhanced security and impact tests and PAS 023 fit for use.

Outer door frame to be *(insert choice)*

Glazing to be 'Acells' self adhesive and clip glazing system with internal slimline bolection.

Hardware to be fitted to 'Acells' Fast Fit™ eurogroove system and comprises of the following components.

- Locking Mechanism
- Handles
- Hinges
- Letterplate
- Knocker
- Viewer
- Low Threshold
- Sub Cill

ACELL DOORS Wood you believe it?

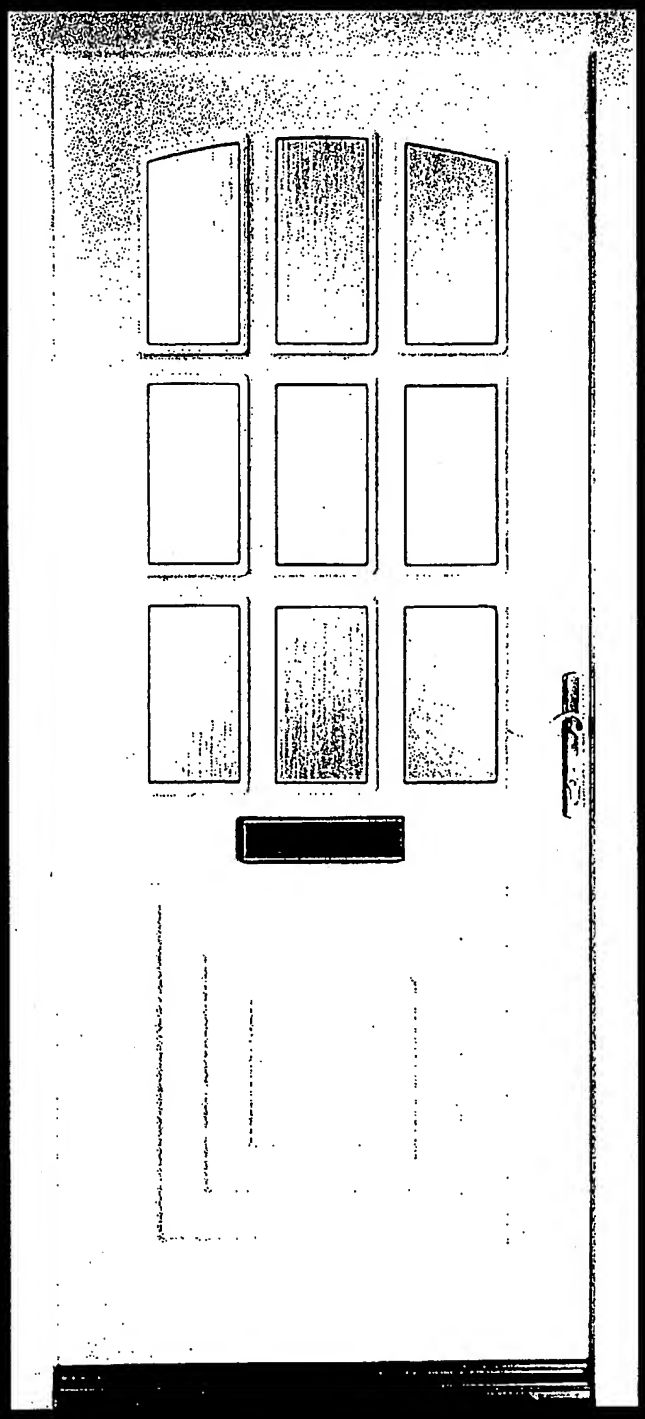
For technical and commercial information contact:
Acell Doors Limited, Chalex Industrial Estate,
Manor Hall Road, Southwick, Sussex BN42 4PA.

ACELL COMPOSITE DOORS

Composite Doors

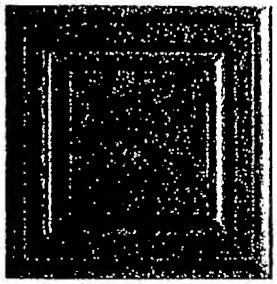
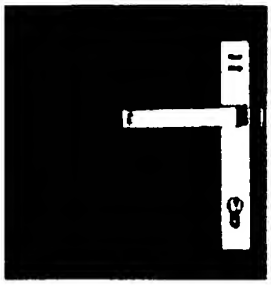
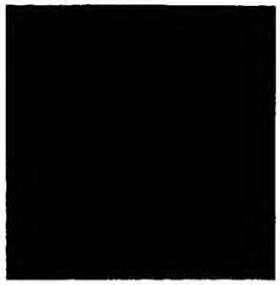
manufacturers of the

ARMOURDOOR
SECURITY DOOR SYSTEMS



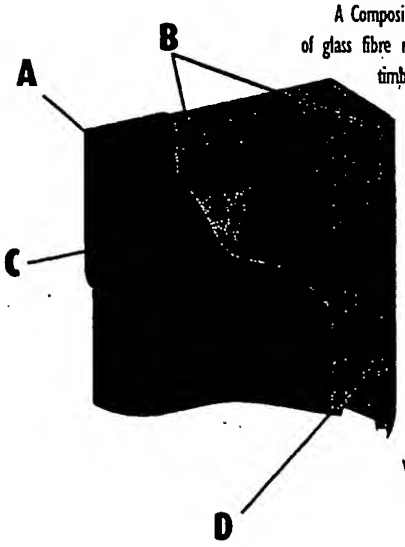
ARMOURDOOR

The *Ultimate* in GRP Doors


- These superior quality doors come factory finished with hardware, glazing and outer frame ready for installing.
- Limitless choice of colours with no need for on-site painting, varnishing or finishing.
- Authentic woodgrain appearance without the maintenance requirements of timber.
- Continuous development ensures that technological advances are considered to provide the highest quality available.
- Kerto® engineered timber subframe unites strength, dimensional precision and stability
- Sealed unit glass (in glazed door options) conforms to BS6206.
- Ten year guarantee against splitting, warping, twisting or colour loss.
- Bespoke applications, solid and glazed options using a wide range of patterned, stained or leaded glass.
- High Security multi-point hookbolt locking system with a steel reinforced PVCu outer frame.
- Robust aluminium edge detail provides a durable and attractive finish to the perimeter of the leaf.

ANATOMY OF OUR COMPOSITE DOOR



A Composite door is manufactured by bonding a pair of glass fibre reinforced skins (A) to an engineered laminated timber sub-frame (B). A core of CFC free high density foam (C) is injected to provide both structural rigidity and high thermal properties. Applied aluminium profile (D) to the perimeter of the leaf gives added durability and increased performance.

Piper have a range of popular colours to choose from although the door can be made to any BS or RAL colour if required. Doors can be supplied to the customers own specification - with or without hardware, and hung in a 65mm or an 80mm PVCu frame. Overall sizes of 1960mm - 2225mm high and 825mm -1055mm wide are available.

CORE FOAM PROPERTIES

Core Density: BS 4370/2/M50

Thermal conductivity:

Tinsley Probe W/MK 0.02

Dimensional stability (max % linear change)

24h 100°C ASTM D 2126	+0.5
24h 20°C ASTM D 2126	+0.2
24h 70°C (95%RH) ASTM D 2126	+0.5

GLASS FIBRE REINFORCEMENT

Tensile strength: M/Pa 100

Compressive strength: M/Pa 150

Impact strenth IZAD: KJ/M2 100

Thermal conductivity: W/MK 0.20

Fire resistance: BS 476 Part 22 Clause 8

The *Ultimate* in GRP Doors